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LIST OF THE SPIDERS, MYRIOPODS AND INSECTS OF LABRADOR.

BY A. S. PACKARD, PROVIDENCE, R. I.

A list of all the known species of terrestrial Arthropods of the Labrador coast may prove convenient as a starting point for future investigations. Hence I have, besides enumerating the species of other groups, revised the lists of Lepidoptera—Mr. Scudder kindly contributing the list of butterflies. For changes in the names of the Tortricidæ I am indebted to Prof. C. H. Fernald's excellent catalogue of the Tortricidæ of the United States.

ARACHNIDA.

The spiders which I collected at various points on the coast were sent to Prof. T. Thorell, of Upsala, for identification and description. Out of ten species collected, seven were new to science. Prof. Thorell's paper was published in the Proceedings of the Boston Society of Natural History, xvii., April 21, 1875.

Epeira patagiata (Clerck). Square Island, Strawberry Harbor.

" *Packardii* Thor. " "

Tetragnatha extensa (Linn.) " "

Linyphia Emertonii Thor. " " and near Dumplin Harbor.

Clubiona frigidula Thor. " "

Gnaphosa brumalis Thor. Strawberry Harbor.

Lycosa Greenlandica Thor. " "

" *fuscifera* Thor. Square Island, and near Dumplin Harbor.

" *fuscula* Thor. Strawberry Harbor.

" *Labradorensis* Thor. Strawberry Harbor and Square Island.

Xysticus Labradorensis Keys. K. K. Zool. Bot. Ges. Wien., 479, 1887.

Ungava Bay (Turner).

MYRIOPODA.

Julus sp. Square Island.

INSECTS.

Orthoptera.

Caloptenus. A Pezzotettix-like species, with short wings. Square Island

Odonata.

Diplax sp., near *rubicundula*. Caribou Island. Dragon flies were very rare on the coast, and I saw none north of the Straits of Belle Isle.

Æschna sp. Caribou Island. Perhaps another species (identified by Dr. P. R. Uhler,) also occurred, and an *Æschna*-like form was observed at Tub Island.

Hemiptera.

Teratocoris sp.

Deltocephalus debilis Uhler. Hopedale. A few other species of Cercopidæ were seen at Caribou Island.

Trigonotylus ruficornis Fallen. Hopedale.

Corixa sp.

Platyptera.

Pteronarcys regalis. Okkak. Hopedale.

Plecoptera.

Potamanthus marginatus Zett. This boreal European May-fly, occurring in Lapland, we have found in abundance in southern Labrador.

Perla sp. Belles Amoures.

Chloroperla sp. A small greenish species was observed at Strawberry Harbor.

Trichoptera.

Desmataulius planifrons Kol. Okkak.

Limnophilus subpunctulatus Zett. This Lapland Caddis-fly is the most abundant species in Labrador, and what are probably its cases are common in the pools of fresh water. Three or four other species also occurred, but have not been identified. No genuine *Neuroptera* or *Mecoptera* (Panorpidæ) occurred.

COLEOPTERA.

Lepyryus colon (Linn.) Cape Chidley (R. Bell).

Pissodes ? sp. Hopedale.

Coccinella lacustris Lec. Okkak.

Leptura sp. Caribou Island.

Crioccephalus obsoletus Randall. Okkak.

- Argaleus nitens* Lec. Near Cape Harrison.
Telephorus fraxini Say. Hopedale.
P. laevicollis Kirby. Hopedale.
Podabrus mandibularis Kirby. Caribou Island.
Sericosomus incongruus Lec. Square Island.
Eanus vagus Lec. Square Island.
E. pictus (Cand.) Horn. (*E. maculipennis* Lec.) Caribou Island to Square Island.
Cryptohypnus bicolor Germ. Belles Amoures, Strawberry Harbor and Indian Harbor.
Byrrhus Americanus Lec. Caribou Island.
B. Kirbyi Lec. (*B. picipes*). Caribou Island.
Atomaria. Not determined. Caribou Island.
Ips sanguinolentus Oliv. Caribou Island.
Bledius. Not determined.
Quedius sublimbatus Mökl. Blanc Sablon (R. Bell).
Tachyporus n. sp. Hopedale.
Creophilus villosus Gray. Caribou Island.
Agathidium obsoletum Lec. Square Island.
Silpha Lapponica Linn. Caribou Island to Hopedale.
Philhydrus bifidus Lec. Caribou Island.
Gyrinus picipes Aubé? Square Island.
G. minutus Linn. Square Island.
G. affinis Aubé? Square Island.
Colymbetes picipes Kirby. Caribou Island and Strawberry Harbor.
C. binotatus Harris (probably).
C. sculptilis Harris. Caribou Island, Square Island, Hopedale.
C. nov. sp. Square Island.
Agabus parallelus Lec. Square Island.
A. longulus Lec.? Stupart's Bay (R. Bell).
A. ambiguus Lec. (*A. infuscatus* Aubé). Caribou Island.
A. subfasciatus Lec. Caribou Island.
A. semipunctatus (Kirby). Caribou Island.
A. laeviodorsus Lec. Caribou Island.
A. punctulatus Aubé. Caribou Island.
A. discolor Lec. Indian Harbor.
Hydroporus catascopium Say. Square Island and Dumplin Harbor.
H. tenebrosus Lec. Caribou Island.

- H. puberulus* Lec. Sloop Harbor and Dumplin Harbor.
H. longicornis. Stupart's Bay (R. Bell).
H. perplexus Shp. Stupart's Bay (R. Bell).
Trechus micans Lec. Belles Amoures.
Patrobus tennis Lec. Square Island.
P. hyperboreus Dejean. Belles Amoures, Straits of Belle Isle, Cape Chidley (R. Bell).
Harpalus herbivagus Say., var. *proximus* Lec. Square Island.
Amara obtusa Lec.
Amara, near *A. melanogastrica* Esch., perhaps *A. brunni*.
A. pennis Dej. Caribou Island.
Amara, "no name." Strawberry Harbor, Square Island and Hopedale.
A. similis Lec. (*Stereocerus similis* Kirby). Caribou Island.
A. hematopus Kirby. Sloop Harbor, Hopedale, Okkak (S. Weiz).
Pterostichus adstrictus Esch., var. *orinomum* Kirby. Mecatina; Gulf St. Lawrence.
Pterostichus hudsonicus Lec. Stupart's Bay (R. Bell).
Pt., species not determined. Hopedale, Sinker Island, off Cape Harrison (Cape Webuc).
Pt. luczottii Dej. Blanc Sablon (R. Bell).
Platynus sinuatus Dej. Belles Amoures, Straits of Belle Isle.
Calathus ingratus Dej. Whole coast.
Carabus chamissonis Fischer. Domino Harbor and Okkak.
Nebria Sahlbergii Fischer. Sloop Harbor, Cape Chidley (R. Bell).
Notiophilus Sibiricus Motsch. Domino Harbor, Square Island.

DIPTERA.

- Scatina estotilandica* Rondani, Archiv, etc. Canestrini iii., fasc. 1, 35, Labrador. Osten Sacken adds: Mr. Rondani, in the same place, mentions *Scatophaga diadema* Wiedemann (Montevideo), as having been received from Labrador.
Helophilus glacialis Loew. Stett. Ent. Zeit. vii., 121.
 " *groenlandicus* (O. Fabr.)
Dolichopus stenhammari Zett. Sloop Harbor, July 19.
Theriopterus flavipes Wied.
 " *septentrionalis* Loew. Verh. Zool. Bot. Ges. Wien., 1858, 593.
Tipula tessellata Loew. Cent. iv., 4.
Tipula septentrionalis Loew. Cent. iv., 3.

Amalopsis hyperborea O. Sacken. Monogr. iv., 269.

Dicranomyia halterata O. Sacken. Monog. iv., 71.

LEPIDOPTERA.

Tineidae.

Glyphipteryx sp. Caribou Island.

Tinea fuscipunctella Harv. (= *Ecophora frigidella* Pack.) Caribou and Square Islands.

Ecophora sp. Hopedale.

Incurvaria Labradorella Clem. Caribou Island.

Ornix boreasella Clem. Caribou Island.

Tinea spilotella Tengström. Caribou Island, Square Island, "Okkak, June." Christoph.

Gelechia continuella Zell. Moeschl. (= *trimaculella* Pack.) Strawberry Harbor.

Gelechia labradorica Moeschl. Moravian Stations.

" *brumella* Clem. Caribou Island.

Tortricidae.

Grapholitha nebulosana Pack. Strawberry Harbor.

Phoxopteris plagosana (Clem.) Caribou Island and Square Island.

" *tineana* Hüb. (Pandemis leucophalerata Pack.) Hopedale.

Sericoris bipartitana (Clem.) Caribou Island.

Pædisca solicitana (Walk.) (Halonota packardiana Clem.) Caribou Is.

Sericoris turfosa H. S.

" *glaciana* Moeschl. Whole coast; common.

Penthina capreana (Hüb.)

" *murina* Pack. Caribou Island.

" *septentrionana* Curtis. Sloop and Strawberry Harbors. (Polar regions, Curtis.)

" *intermistana* (Clem.) (P. tessellana Pack.) Caribou Island to Hopedale.

frigidana Pack.

Conchylitis deutschiana Zetterstedt (Lozopera? fuscostrigana Clem.; C. chalcana Pack.)

Sciaphila osseana Scopoli (Ablabia pratana Hüb.)

" *moeschleriana* (Wrccke).

" *niveosana* Pack. Moravian Stations, August.

Pyalidae.

- Crambus unistriatellus* Pack. Caribou Island.
 " *argillaceellus* Pack. Square Island.
 " *trichostomus* Christoph. Moravian Stations.
 " *labradorensis* Christoph. " Okkak, July."
 " *albellus* Clem. Mouth of Esquimaux river, Aug. 3.
 " *inornatellus* Clem. Caribou Island, July 15.
Eudorea centuriella Christoph. (*Pempelia fusca* Harv., *Eudorea*?
frigidella Pack.)
Eudorea? *albisinuatella* Pack. Okkak.
Pyrausta borealis Pack. Square Island.
Botys ephippialis Zettst.
 " *torvalis* Moeschl.
 " *inquinatalis* Zell. (Scopula glacialis Pack.) Hopedale.

Phalenidae.

- Eupithecia luteata* Pack. Caribou Island, July.
 " *gelidata* Moeschl. Moravian Stations.
Glaucopteryx caesiata (S. V.) Whole coast.
 " *polata* (Dupon.) Whole coast.
 " *phocataria* Pack.
Epirrita dilutata (Borkh.) Moravian Stations.
Petrophora truncata (Hufn.) Whole coast.
 " *prunata* (Linn.) " "
 " *populata* (Linn.) " "
 " *suspectata* Moeschl. Moravian Stations.
Ochyria munitaria Hübn. Caribou Island and var. *labradorensis* Pack.
 " *abrasaria*, H. Sch. Caribou Island.
Rheumaptera lugubrata Staud. Whole coast.
 " *postata* (Linn.) Whole coast.
 " *disceptaria* (F. R.) Moravian Stations.
Triphosa dubitaria (Linn.) Caribou Island.
Semiothisa dispuncta Walk. (Sex-maculata Pack.) Square Island.
Anaitis sororaria Hübn. Moravian Stations.
Aspilates gilvaria S. V. " "
Acidalia sentinaria Hübn. " "
 " *frigidaria* Moeschl. " "

Noctuidae.

<i>Brephos parthenias</i> (Linn.)	Moravian Stations.	
<i>Plusia u-aureum</i> Boisd.	" "	
" <i>parilis</i> Hübn.	" "	
" <i>divergens</i> Fabr.	" "	
<i>Anarta funesta</i> (Thunberg).	" "	
" <i>melanopa</i> (Thun.)	" "	
" <i>melaleuca</i> (Thun.)	" "	Whole coast.
" <i>vidua</i> Christoph.	" "	
" <i>cordigera</i> (Thun.)	" "	
" <i>algida</i> Lef.	" "	
" <i>lapponica</i> (Thun.)	" "	
" <i>schonherri</i> Zett.	" "	
" <i>zetterstedtii</i> Staud.	" "	
<i>Hadena exulis</i> Lef.	" "	
" <i>exornata</i> Moeschl.	" "	
<i>Pachnobia carnea</i> Thun.	" "	Whole coast.
<i>Mamestra arctica</i> Boisd.	Whole coast.	
<i>Dianthoecia subdita</i> Moeschl.	Moravian Stations.	
" <i>phoca</i> Moeschl.	" "	
<i>Agrotis septentrionalis</i> Moeschl.	" "	
" <i>fusca</i> Boisd.	" "	
" <i>Wockei</i> Moeschl.	" "	
" <i>speciosa</i> Hubn.	" "	
" <i>comparata</i> Moeschl.	" "	
" <i>dissona</i> Moeschl.	" "	
" <i>umbratus</i> Pack.	" "	
" <i>confusa</i> Fehr.	" "	
<i>Leucania rufostriata</i> Pack.	Caribou Island.	

Bombycidae.

<i>Hepialus labradoriensis</i> Pack.	Caribou Island.
" <i>hyperboreus</i> Moeschler.	Moravian Stations.
<i>Laria Rossii</i> (Curtis)	Whole coast.
<i>Arctia Quensellii</i> Paykull.	Whole coast.
<i>Platartia borealis</i> (Moeschler).	Moravian Stations.
<i>Euprepia caja</i> (Linn.)	Whole coast.

*RHOPALOCERA.

Brenthis chariclea (Schneid.) This is the *Argynnis boisduvalii* of the previous list. A detailed description of the species, drawn up exclusively from American material, will be found in the Proc. Bost. Nat. Hist., Vol. xvii., p. 297.

Brenthis tricularis (Hübner.) = *Argynnis tricularis* of the previous list. A full description will be found as above on p. 294.

Brenthis polaris (Boisd.) = *Argynnis polaris* of the former list. A full description, based entirely on Dr. Packard's material, will be found as above, p. 303.

Brenthis frigga (Thunb.) = *Argynnis frigga* of the former list. The single male obtained in Labrador, with specimens from Colorado, taken by Mr. Mead, form the basis of a detailed description in the same place as the preceding, p. 306.

Eugonia j-album (Boisd.-Lec.) = *Grapta interrogationis* of the previous list. This is the worst error in that list, and a case of pure carelessness in writing.

Eneis jutta Hübner. = *Chionobas jutta* of previous list.

" *bore* (Esp.) = *Chionobas bore* of former list.

" *ceno* (Boisd.) = *Chionobas ceno* of former list.

Agriades aquilo (Boisd.) = *Lycæna aquilo* of former list. An extended description from Dr. Packard's material will be found in the Proceedings of the Bost. Soc. Nat. Hist. vol. xvii, p. 310.

Pieris frigida Scudder. I have not re-examined this.

Eurymus Labradorensis (Scudder.) This is the *Colias palæno*, as well as the *C. Labradorensis* of the previous list. The specimen referred to the former being of the same species as the latter. I will not here venture on a discussion as to the validity of the specific name retained here, but as the species was described and figured sufficiently for determination, and is the common form in south-eastern Labrador, it is easily identifiable.

*A revised list of the butterflies obtained in Labrador by Dr. A. S. Packard, by Samuel H. Scudder. (The list was prepared for use in the present work. The species have been arranged in the descending order by the author.) In 1886 I published a list of Dr. Packard's collections in the Proceedings of the Boston Society of Natural History, Vol. xi. The present list is merely a redetermination of the same material, in the light of larger collections since seen. The same order as before is followed. The specimens are mostly in my collection and in that of the Museum of Comparative Zoology.—S. H. S.

Eurymus nastes (Boisd.) = *Colias nastes* of former list. I have not re-examined specimens, as they are apparently no longer extant.

Pamphila comma (Linn) = *Hesperia comma* of my former list. The single specimen obtained was not examined by me in my study of the species of *Pamphila* (Memoirs Bost. Soc. Nat. Hist. ii., 341), and is the only specimen I have seen of *P. comma* from America. It belongs to the var. *catena* Staud, found in northern Scandinavia and Lapland, and exactly resembles the specimen of that variety figured by me in the memoir referred to above. Moschler has already noted that it is this variety which occurs in Labrador.

Hesperia centaureae Ramb. Nothing to be added.

HYMENOPTERA.

Urocerus flavicornis Fabr. Common on Caribou Island.

" *cyaneus* Fabr. Hopedale.

Euura orbitalis Norton. Var. a. b. Caribou Island.

Nematus Labradoris Norton. Caribou Island.

" *malacus* " " "

" *fallax* " " "

" *monela* " " "

" *fulvipes* " " "

" *placentus* " " "

Allantus originalis " " "

Macrophya (Pachyprotasis) omega Norton. Caribou Island.

Tenthredo mellinus Norton. Caribou Island.

" *cinctitibiis* " " "

Formica herculanea Linn. Whole coast.

" *sanguinea* Latr. Straits of Belle Isle.

Vespa maculata Linn. Southern coast, Mecatina Island.

norvegica Fabr. Caribou Island.

Bombus lacustris Cresson. Whole northern coast; common.

" *kirbyellus* Curtis. Sloop Harbor and Hopedale.

" *frigidus* Smith. Square Island and Hopedale.

" *nivalis* Dahlb. Caribou Island and whole coast northward.

JOHN ABBOT, THE AURELIAN.

BY SAMUEL H. SCUDDER.

It has been a fortunate thing for the study of butterflies in this country that the earlier students were those who devoted themselves very largely to the natural history of these insects rather than to their systematic or descriptive study. It was indeed a natural and healthy result of the poverty of external resources in earlier times; and I have thought that it would not be devoid of interest to present a few facts concerning the life and industry of one of these earlier naturalists, who worked to such good purpose and accomplished so much, under circumstances that would now seem very forbidding.

A unique figure, perhaps the most striking in the early development of natural history in America, is that of a man of whom we know almost absolutely nothing excepting what he accomplished. With one exception, all our knowledge of his personality comes through tradition. No life of him has ever been written, excepting a brief notice by Swainson in the Bibliography of Zoology, to which Mr. G. Brown Goode has kindly called my attention. It is not known when or where he was born, or when he died; scarcely where he lived, or to what nationality he belonged. Even the town where he worked no longer exists. His name alone remains, and though we have access to not a little of his writing in his own round hand, his signature cannot be discovered.*

John Abbot was presumably an Englishman, as the name is English, and he is said by Sir. J. E. Smith, to have begun his career by the study of the transformations of British insects. When not far from thirty years old, and probably about 1790, he was engaged by three or four of the leading entomologists of England, to go out to North America for the purpose of collecting insects for their cabinets. After visiting several places in different parts of the Union, he determined to settle in the "Province of Georgia," as Swainson calls it. Here he lived for nearly twenty years in Scriven County, as I am informed by several persons through the kindness of Dr. Oemler, of Wilmington Island, in that State, returning to England probably not far from 1810, where he was living about 1840, at the age "probably above eighty." It is rumored in

*Mr. W. F. Kirby has kindly made many researches for me at the British Museum, the Linnæan Society, etc.

Georgia that he owned land there, and all that can be learned of him comes from persons beyond middle life in that State, who remember hearing their parents speak of him. Col. Charles C. Jones, the Georgia historian, informs me through Dr. Oemler that "while he remained in Georgia, in the prosecution of his scientific labors, his head-quarters were at Jacksonborough, then the county seat of Scriven County. Here his work on the Lepidoptera of Georgia was largely prepared. All traces of this old town have now passed away." It is supposed that he also employed himself as a school-master in this place, but this is purely traditional, and his occasional bungling, not to say ungrammatical sentences, rather indicate a lack of schooling on his own part. What we certainly know regarding him is that he entered into relations with John Francillon, a silversmith in the Strand, London, who had a famous collection of insects and an extensive entomological correspondence. Francillon undertook to supply subscribers with drawings of insects and plants by Abbot, as well as with specimens, the latter of which, says Swainson, "were certainly the finest that have ever been transmitted as articles of commerce to this country; they were always sent home expanded, even the most minute; and he was so watchful and indefatigable in his researches, that he contrived to breed nearly the whole of the Lepidoptera. His general price for a box-full was sixpence each specimen; which was certainly not too much, considering the beauty and high perfection of all the individuals. Abbot, however, was not a mere collector. Every moment of time he could possibly devote from his field researches was employed in making finished drawings of the larva, pupa, and perfect insect of every lepidopterous species, as well as of the plant upon which it fed. These drawings are so beautifully chaste and wonderfully correct, that they were coveted by every one." It would appear from a note in Kirby and Spence's Introduction to Entomology (5th ed., iii., 148) that "the ingenious Mr. Abbot" also knew the art of inflating caterpillar skins, and dealt in them through Francillon. (See many other references in the same volume.) There still exist in various places, principally in the British Museum, but also at Oxford, Paris and Zurich, and in this country at Boston, large series of his drawings of insects and plants. Those in the British Museum are arranged in sixteen stout quarto volumes, bound in red morocco; each volume has a printed title page and is dated 1792 to 1809, the dates no doubt between which they were purchased for the Museum through Francillon from Abbot, and which probably indicated the period of his

activity in America. In Boston two similar volumes exist, one of which was presented by Dr. Gray of the British Museum, to Dr. Gray the botanist of Cambridge, and by him to the Natural History Society, where it may now be seen. The other volume is a collection, perhaps the only considerable one which has never passed out of this country, which was purchased by the Society from Dr. Oemler, of Georgia, who inherited it from his father.*

In the title page of the last volume of the British Museum series there is a miniature portrait let into the title page, which, tradition says, was painted by Abbot himself, and indeed it bears every mark of this, though there is no memorandum to this effect within the volume. With its peculiar physiognomy it adds considerably to our interest in the original; there seems to be not a little humour in the quaint features and figure, and the spare form hardly gives the figure of robust health which the face would indicate. Abbot probably returned to England about 1810, at an age of about fifty, and our portrait was doubtless painted at about this time, certainly before he left America, since it represents him in the thinnest of southern costume. There were old persons living in Georgia up to 1885, but since deceased, who knew him, but apparently none now remain.

Abbot's work was by no means on Lepidoptera alone, as any of the series of his drawings will show. Dr. Hagen, in speaking of the volume in the British Museum containing the Neuroptera, says that all the details are given with the greatest care, and that in almost all cases the species can be identified. The same is the case with most of the drawings of Lepidoptera, though there is a mark of carelessness in some of the figures of early stages which is not found in others; this is no doubt due to the fact that so many applied for these drawings, "both in Europe and America, that he found it expedient to employ one or two assistants, whose copies he retouched, and thus finished they generally pass as his own. To an experienced eye, however, the originals of the master are readily distinguished."

It would hardly appear that he paid more attention to Lepidoptera than to other insects. Yet in the Oemler collection alone there are one hundred and thirty-three plates of Lepidoptera, nearly every one of which

*Mr. Oemler and Mr. "Le Compte" are both mentioned in Abbot's notes as sending him specimens.

figures a species distinct from the others, and ninety-four of which are accompanied by the early stages. Twenty-two of these are insects figured in Abbot and Smith's work, but the figures of the early stages are in no case identical; they represent the same insect but in different attitudes. Of these one hundred and thirty-three plates, thirty-four are concerned with the butterflies. The drawings of butterflies in the British Museum are contained in the sixth and sixteenth volumes, the former comprising the perfect insects only, the latter the early stages as well, and in this latter series thirty-six species are figured; while the two Boston collections contain figures of the early stages of all but two of the species represented in the British Museum volume. Swainson states that a series of one hundred and three subjects of Lepidoptera, including none published before, was executed for him "with the intention of forming two additional volumes to those edited by Dr. Smith, but the design is now abandoned."

Each set of drawings furnished by Abbot seems to have been accompanied by more or less manuscript, in which the life history of the insect is given in brief form, with the food plant of the caterpillar and the times of the change of the caterpillars to chrysalids, and of chrysalids to butterflies, which shows that Abbot must have been an exceptionally industrious rearer of insects. Indeed the transformations of not a few of our butterflies are even now known only through the observations and illustrations of Abbot. Dr. Boisduval was good enough to present me with three series of manuscript notes entitled "Notes to the Drawings of Insects," all written in Abbot's own hand, and comprising twenty-seven foolscap pages, rather closely written, and describing the changes of two hundred and one species; of these thirty-eight are butterflies. These, unfortunately, are referred to only by number and by an English name, which Abbot himself applied, apparently to every insect of which he furnished drawings, such as the "reed butterfly," the "ringed butterfly," the "lesser dingy skipper," etc, though he occasionally makes use of such names as the "autumnal ajax," "*Papilio antiopa*," etc., showing his familiarity to a certain extent with Linnean names. As the names and drawings are in some instances kept together, the manuscript of those in which they are not connected is still of use. It appears that nearly all the Georgian butterflies were observed and painted by Abbot, and that of about sixty species which he raised he distributed illustrations and notes of the early stages to some of his correspondents.

As is well known by all aurelians, one considerable collection of Abbot's drawings was published by Sir James Edward Smith in two sumptuous folio volumes, but these comprise, as far as the butterflies are concerned, only twenty-four species. This work made an epoch in the history of entomology in this country. Besides this Abbot published nothing. The article credited to him in Hagen's Bibliography was by a Rev. Mr. Abbot, who wrote from England in November, 1798, when Abbot was in this country.

CHARACTERS OF PROTECTION AND DEFENCE IN INSECTS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

A few years since I described a colony of Spanner caterpillars (*Geometridæ*) belonging to an undetermined species, and the description appeared afterwards in this journal. These larvæ were remarkable for their mimicry, in color and shape and attitude, of dead leaves. There could be no question that they belonged to the category of protective appearance, to which so many green and brown tinted larvæ belong, which share these "cosmical colors." In studying these larvæ we must consider their color, shape and attitude separately. The larvæ of most of the Hawk Moths belong to this category. The caterpillar in repose, or at the approach of danger, assumes a rigid attitude in which it resembles a leaf on a branch of the food plant. The markings along the back often assist this resemblance. The only motion is that imparted by the swaying of the plant on which it rests. When disturbed, the caterpillar of *Thyreus Abbotii* throws itself by jerks from side to side and gives out a crepitating noise. It looks then somewhat snake-like.

The second category is that of defensive appearance. Highly colored, red and yellow larvæ, belong many of them to this category, as also those armed with spines and prickles. These would seem to court observation, which they further aid by their restlessness. It is probable that, by their gaudy appearance, they inspire distaste or fear in their natural enemies. The caterpillars of *Orygia* are not eaten by birds, nor are those of *Abraxas*. By simulating obnoxious species it has been shown that several kinds of butterflies escape destruction. From these two points of view the appearance of insects must be studied, but it by no means follows that the means to the end have been always perfectly attained.

It is owing to the imperfection of their protection that insects are, as a whole, kept under and an undue multiplication prevented. But there is, probably, an effort in these directions to be noted and brought out in the life history of all insects. Darwin's law of Natural Selection tends to bring out these characters more strongly by its effect of preserving the best protected kinds. I have noted how the species of *Catocala*, so numerous with us, are preserved; the larvæ, by their resemblance to twigs, the moths, from their upper wings, during the day and in repose, corresponding in appearance with the trunk and bark of the trees against which they rest. The larvæ of burrowing Lepidoptera resemble in their pale and livid colors those of the Coleoptera or burrowing larvæ of other Orders of Insects. The larvæ of Hymenoptera, which are external feeders, resemble the external feeding Lepidoptera in their greenish tints. There is then a correlation between habit and color. The larvæ of cut-worms (*Agrotis*) resemble the soil in color, where they burrow at the roots of plants.

In South Carolina I collected a number of specimens of an Orthopterous insect, which strikingly resembled the predaceous Cicindelide. They were active on the leaves of Okra. I regret that the specimens were lost, and I could not determine the species. I have observed that certain smooth Chrysomelidæ, living on a species of lily, on the approach of danger folded in the feet and allowed themselves to slide off the leaves, dropping in the herbage beneath where they speedily recovered the use of their legs. The snapping beetles, *Elateridæ*, assume a rigid attitude, the short feet tucked in against the under part of the hard body, and look like bits of dead wood or twigs. By their quiet and protective color they seem to expect that they will escape notice. This and similar actions in other kinds of beetles and insects is called "feigning death" by some writers. In order to "feign death," as the words intend, some knowledge of death as such and its advantages must be supposed. But I cannot think that insects have arrived at any such generalization of ideas. Their actions often incompletely answer to their apparent ends. It is probable to me that their attitudes of repose are assumed from the experience which they have gradually acquired that in a state of quiet they will best avoid the immediate dangers which beset them and which they cannot escape by flight. A *Catocala* will rest in quiet for hours, but on the near approach of a disturber will take to very quick and instant flight. Trying to capture a specimen once it thus escaped me, but in its endeavor to avoid Charybdis it fell into Scylla, for a passing swallow devoured it in the air.

The characters of protection and defense form an interesting subject in the natural history of external feeding larvæ, such as those of the Lepidoptera, for here the insect must rely on them and can do little or nothing by movement. Therefore they can here be the more readily detected. In tracing descent and relationship between the species, the modifications of the external character of the larvæ must lead to the best results, to the safest conjectures as to the line taken. Almost all our knowledge as to any species and its habits is fragmentary and incomplete. What piece and parcel we observe we are apt to be very certain about, and we do not hesitate to draw therefrom very absolute conclusions, with an air of authority incommensurate with our knowledge. But in the multitude of counsellors there is in this case so far safety, that each may bring his observations and conclusions to paper, and, if the editor will print them, from the sifting of the whole a picture will in time be drawn which will stand in some proportion to the real truth.

THE ORANGE SPOT IN NATHALIS IOLE, Bdw.

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

On November 1st, 1887, I took in this locality (Swift Creek, near West Cliff,) an example of *Nathalis iole*, and was thereby led to examine its characters. The general colour of the upper side of this insect is pale yellow. The primaries are marked with pale black (if one may use such a term,) after the manner described in the text books, and the upper margins of the secondaries also present a black patch, covering the area which is normally overlapped by the primaries. On this black patch, not far from the base of the wing, is an *elongated spot of the most vivid orange*. I first noticed this spot when setting out my specimen, and was led to wonder why the most vivid piece of colouring in the whole insect should be situated where it was invisible under ordinary conditions. Could it be due to some peculiarity in the development of the pigment induced by its peculiar position on the wing? was it a relic of the original colour of the insect, which not being under the same influences as the exposed parts, had not become modified in the course of ages? or was it a secondary sexual character to be exhibited by the raising of the primaries?

Being unable to answer these questions, I put the insect away until January 12th, when I sent it off with other butterflies to Mr. W. H.

Edwards, calling his attention to the presence of the orange spots. He wrote in reply that he could not tell why some examples of *N. iole* had the orange spot and others not, but it was a very variable species. On March 5th I received the box I had sent, and in it my specimen of *N. iole*, which, to my great astonishment, had *completely lost the orange spots*,—they having become pale yellow, the colour of the rest of the wing (except the black portion), only somewhat glossy. The orange shade on the under side of the primaries, near the costal margin, had not faded in the least. Supposing that the butterfly might have been submitted to some unusual influence while in Mr. Edwards' hands, I wrote to him asking the exact circumstances under which he had kept it, and he replied as follows: "The particular specimen which you sent and I returned never was outside your box, and the latter rested on top of one of my insect cases, so that no chemical influence was brought to bear on it. Last year I raised several *iole* imagos from larvae, and the males I think all had the orange spot; I am sure some had. On looking at them now (March 16), I find *no orange at all*." So it is perfectly clear that the orange spot in *Nathalis* is of a peculiar nature, and is further liable to fade, which process is not one of continuous and gradual bleaching due to the action of light—because my specimen was all the time in a closed box in perfect darkness, and the orange remained as vivid as ever up to the time that I sent the insect to Mr. Edwards—but is more or less sudden, and apparently due to change in the *constitution* of a complex pigment, rather than its destruction. However this may be, I think that however insignificant this question may seem from the point of view of the systematist, it is one which the evolutionist will recognize as demanding his careful attention, and this must be my excuse for dealing with it at so great a length.

NOTE ON A GERMAN EDITION OF ROSS'S SECOND
VOYAGE (1829-1833).

BY A. R. GROTE, A. M.

A copy of a German translation of Ross's Second Voyage lately fell into my hands, and I make the following bibliographical note upon the descriptions of Lepidoptera there given. The translation is by Julius, Graf von der Gröben, Lieutenant in K. Pr. Reg. Garde du corps, and the third part or volume is published in Berlin, 1836. This volume (8 vo.)

contains the natural history, the descriptions of the Lepidoptera occupying pages 238 to 255 inclusive. The following are the references :

Colias Boothii (Curtis), p. 238.

" *Chione* (Curtis), p. 239.

Hipparchia Rossii (Curtis), p. 241.

" *subhyalina* (Curtis), p. 242.

Melitæa Tarquinius (Curtis), p. 243.

Polyommatus Franklinii (Curtis), p. 245.

Laria Rossii (Curtis), p. 247.

Eyprepia Hyperboreus (Curtis), p. 249.

Hadena Richardsoni (Curtis), p. 250.

Psychophora Sabini (Kirby), p. 251.

Oporabia Punctipes (Curtis), p. 252.

Orthotania Bentleyana (Don), p. 253.

" *Septentrionana* (Curtis), p. 254.

Argyrotosa (?) *Parryana* (Curtis), p. 254.

I have identified the moth *Laria Rossii* from specimens taken by Mr. Mann on Mount Washington, N. H.

DESCRIPTION OF A NEW SPECIES OF ANTHOCHARIS.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Anthocharis Pima.

MALE—Expands 1.75 inch.

Upper side yellow; the bases of wings dusted black; primaries have the basal half of costa white, crossed by dark brown streaks; the apex also edged white on both margins, and next this is a series of five large, elongated, dark brown spots, almost confluent, filling the interspaces to second medium nervule, each sending a narrow projection to the margin; on the arc a black rectangular bar, the area between this and the apical spots and costal edge orange; fringes whitish; a few blackish hairs at the end of each nervule on secondaries.

Under side of primaries yellow; the apical area greenish, dusted with black scales; the orange repeated paler and diffused over cell and second median interspace; the bar on arc repeated.

Secondaries pale yellow, largely covered by patches of light yellow-green, confluent, forming irregular and connected transverse bands from hind margin to base.

FEMALE—Expands 1.7 inch.

Same yellow; the apical spots longer and completely confluent, forming a solid patch; the orange paler; the bar on arc less rectangular; broadest on sub-costal; under side as in the male.

From two examples taken early in April, 1883, in Pima County, Arizona, by Mr. O. T. Baron. In all 2 ♂ and 2 ♀ were taken. This is the only known North American species in which both sexes are yellow. The brown apical patch is much larger than in the allied species.

BOOK NOTICE.

THE BUTTERFLIES OF SOUTH AFRICA.

South African butterflies: A monograph of the extra-tropical species. By Roland Trimen, F. R. S., etc., assisted by James Henry Bowker, F. Z. S., etc. Vol. I: Nymphalidæ; Vol. II: Erycinidæ and Lycaenidæ. London: Trubner & Co., 1887, 8 vo.

All who have studied foreign butterflies at all are acquainted with Trimen's work on the butterflies of Southern Africa, published more than twenty years ago, under the title *Rhopalocera Africae Australis*. It will please them to know that there has recently appeared the first two of three volumes on the same subject, which are based, indeed, upon the old, but wholly rewritten, and with a great wealth of additions, especially on the natural history side. These two volumes comprise the Nymphalidæ, Erycinidæ and Lycaenidæ, in all 238 species. The Papilionidæ and Hesperidæ are to occupy the third volume with about 142 species. It will thus be seen that Mr. Trimen falls into line with all the principal lepidopterists of England in the serial order in which he here places the different families of butterflies, adopting, indeed, exactly the subdivisions and the order Mr. Moore employed in his *Lepidoptera of Ceylon*, which we noticed lately. But he does more than that; for, in a long introductory chapter of 44 pp., he treats of the structure, classification and distinctive characters of the groups, together with their geographical distribution, their habits and instances of mimicry in an excellent manner, such as is very unusual in a work of this nature. It would interest every reader of the *CANADIAN ENTOMOLOGIST*. So, too, all the families, sub-families and generic groups are characterized with a fulness entirely proportional to the specific descriptions, rendering the work one of the best introductions to a fauna known to me. These descriptions are evidently the work of one who is quite familiar with structure, are not copied from the writings of others, but

are introduced in language of the author's own, having a special value quite apart from the rest of the work. Nor is this all; for the characters are drawn not simply from the complete stage of the insects, but from the larva and pupa as well, and these same stages are introduced in the generic descriptions. It is unfortunate that he has not included also the egg. The work is illustrated so far by ten octavo plates, one of which is devoted to the structure of the wings, the head and legs of the imago; two to the early stages of a few species, and the remainder to excellent chromolithographs of the perfect insects. The figures of the early stages are an interesting, though somewhat scanty, addition to our knowledge, the most important of which is found in the larva and pupa of D'Urbania, a curious genus of Lycaeninae, in which the pupa, as well as the larva, is covered with long fascicles of hairs, as long as the width of the body. Mr. Trimen has been aided by collectors and naturalists throughout Southern Africa to a very great extent, so much so, indeed, that he has added to his title page the name of one of them, Col. Bowker, as joint author with himself; and the help he has received in this respect may be indicated in part by the considerable number of species which have been added to the list of South African butterflies since the publication of his first work, a total of 380 against 197. An excellent coloured map of Southern Africa, south of the tropic of Capricorn, is prefixed to the first volume. We hope the third volume, completing the work, will soon be issued.

SAMUEL H. SCUDDER.

CORRESPONDENCE.

REMEDY FOR ROSE-APHIS.

Dear Sir: Experiments with a weak solution of Creolin upon Rose Aphides and leaf-tying larvæ (*Tortrix*) proved quite successful without any apparent injury to the plants. Rose bushes syringed with Creolin solution remained for some time after free from insects of any kind so far as I could observe. More continued use of Creolin must be made to speak with certainty, but it seems to me likely that in this disinfectant we may have a valuable help for garden or greenhouse.

A. R. GROTE.

Mailed August 1st.

